REMARK. Mr. Drummond raises the question as to whether Mr. J. F. Travis's solution of problem 87, Arithmetic, is strictly an arithmetical solution. To my mind it is strictly an algebraical solution. A pure arithmetical solution of a problem would involve only the operations of addition, subtraction, multiplication, division, involution, and evolution, without the use of equations. A solution in which the result sought is represented by some character, and then this character operated upon until certain conditions of the problem are fulfilled, which conditions are then stated in the form of an equation from which the numerical value of the character is to be determined, is an algebraic solution. It is immaterial what sort of a character is used, whether it be $(\frac{2}{2})$, $\frac{3}{3}$, x, ϕ, or any other character. However, the solution referred to is a very good one, and by the use of such solutions students in arithmetic are given, unconsciously to themselves, a most excellent preparation for the study of algebra. The mathematician is often called upon to solve problems in a certain way. When a problem is proposed and the restriction put upon it, viz., that it be solved by arithmetic, or algebra, or geometry, the problem often becomes impossible. From such unfortunate restrictions, has arisen the idea of the insolvability of the three famous problems of geometry, viz., the Trisection of an Angle, the Duplication of the Cube, and the Quadrature of the Circle. These problems are each easily solved if the solutions are not restricted to the use of the straight edge and compass only. But with these restrictions they are absolutely unsolvable.

There are many problems whose solutions cannot be effected when restricted in the way previously mentioned, but those referred to above are the only ones that have become famous.

ALGEBRA.

81. II. **Solution by C. W. M. BLACK, A. M., Professor of Mathematics, Wesleyan Academy, Wilbraham, Mass.**

[See problem and solution I, in April number, page 105.] The proposition cannot be proved unless r is integral and positive, as can be shown by substitution of numerical values.

Consider the only two fractions in whose denominators any factor as (a_1-a_2) appears, putting them in the form

$$(a_1{}^r)/[(a_1-a_2)(a_1-a_3)(a_1-a_4)\ \ldots\ldots(a_1-a_n)]-(a_2{}^r)$$
$$/[(a_1-a_2)(a_2-a_3)(a_2-a_4)\ \ldots\ldots(a_2-a_n)]=(a_1{}^r)$$
$$/[(a_1-a_2)(a_1{}^{n-2}P_1a_1{}^{n-3}+P_2a_1{}^{n-4}-\ldots\ldots\pm P_{n-2})]$$
$$-(a_2{}^r)/[(a_1-a_2)(a_2{}^{n-2}P_1a_2{}^{n-3}+P_2a^{n-4}-\ \ldots\ldots\pm P_{n-2})],$$

where P_k=the sum of the products of a_3, a_4, $\ldots\ldots a_n$ taken k at a time.

Combining, we have